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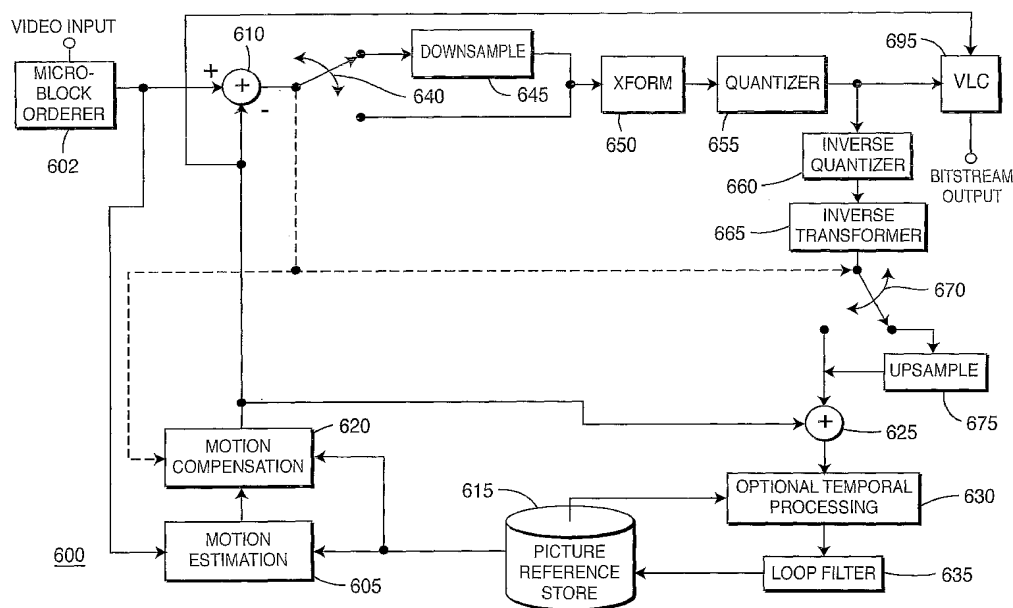
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[Continued on next page]

(54) Title: REDUCED RESOLUTION UPDATE MODE FOR ADVANCED VIDEO CODING



(57) Abstract: There is provided a video encoder, video decoder and corresponding encoding and decoding methods for respectively encoding and decoding video signal data for an image slice. The video encoder includes a slice prediction residual downsampler (645) for downsampling a prediction residual of at least a portion of the image slice prior to transformation and quantization of the prediction residual. The video decoder includes a prediction residual upsampler (715) for upsampling a prediction residual of the image slice.

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2005/006453

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 H04N7/26 H04N7/50 H04N7/46

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>"Recommendation H.263: Video coding for low bit rate communication" ITU-T DRAFT RECOMMENDATION H.263, February 1998 (1998-02), pages 1-167, XP002176560 cited in the application</p> <p>page 4, paragraph 3.4.9 page 9 - page 13, paragraph 4.2 page 23 - page 27, paragraphs 5.1.3, 5.1.4 page 85 - page 88, paragraphs K.1, K.2 page 129 - page 142, paragraphs Q.1-Q.7.2 Figure 3/H.263 figure Q.1/H.263</p> <p>----- -/--</p>	<p>1-3, 5-8, 12, 13, 15, 17-20, 23-25, 27-30, 32, 34, 35, 37, 39-42</p>

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

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- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

24 May 2005

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06.10.2005

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## INTERNATIONAL SEARCH REPORT

International Application No

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>"TEXT OF FINAL COMMITTEE DRAFT OF JOINT VIDEO SPECIFICATION (ITU-T REC. H.264 / ISO/IEC 14496-10 AVC)"  INTERNATIONAL ORGANIZATION FOR STANDARDIZATION - ORGANISATION INTERNATIONALE DE NORMALISATION,  July 2002 (2002-07), pages I-XV,1,  XP001100641  cited in the application  page 9, paragraph 6.2  page 11 - page 12, paragraph 6.4  figures 6-5,6-6  page 67 - page 72, paragraph 8.5  page 136 - page 141, paragraph 12.4.1  page 33 - page 34, paragraph 7.4.2.2</p>	<p>1-3,5-8,  12,13,  15,  17-20,  23-25,  27-30,  32,34,  35,37,  39-42</p>
A	<p>US 5 262 854 A (NG ET AL)  16 November 1993 (1993-11-16)</p> <p>the whole document -----</p>	<p>1-3,5-8,  12,13,  15,  17-20,  23-25,  27-30,  32,34,  35,37,  39-42</p>
A	<p>WO 95/15538 A (POLAROID CORPORATION)  8 June 1995 (1995-06-08)</p> <p>page 11, line 27 - page 23, line 16 -----</p>	<p>1-3,5-8,  12,13,  15,  17-20,  23-25,  27-30,  32,34,  35,37,  39-42</p>

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2005/006453

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-3, 5-8, 12, 13, 15, 17-20, 23-25, 27-30, 32, 34, 35, 37, 39-42

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-3,5-8,12,13,15,17-20,23-25,27-30,32,34,35,37,39-42

Video encoder with prediction residual downsampling before transform and quantization.

- 1.1. claims: 1,2,5-7,12,13,17-19,23,24,27-30,32,34,35,39-42

Video encoder with prediction residual downsampling before transform and quantization compliant with ITU-T H.264 standard.

- 1.2. claims: 1,3,8,12,15,20,23,25,34,37

Video encoder with prediction residual downsampling before transform and quantization with downsampling operation depending on direction.

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2. claims: 1,4,9,10-12,14,16,21-23,26,31,33,34,36,38,43

Video encoder with prediction residual downsampling before transform and quantization with downsampling operation performed in units of slices.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

national Application No

PCT/US2005/006453

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5262854	A	16-11-1993	AU 3434293 A	13-09-1993
			BR 9305941 A	21-10-1997
			CA 2130479 A1	02-09-1993
			CN 1076824 A	29-09-1993
			CZ 9401954 A3	15-02-1995
			DE 69324134 D1	29-04-1999
			DE 69324134 T2	28-10-1999
			DK 627153 T3	17-04-2000
			EP 0627153 A1	07-12-1994
			ES 2130252 T3	01-07-1999
			HU 70722 A2	30-10-1995
			JP 7504074 T	27-04-1995
			KR 266238 B1	15-09-2000
			MX 9300930 A1	01-08-1993
			PL 170173 B1	31-10-1996
			RU 2106759 C1	10-03-1998
			SG 64306 A1	27-04-1999
			SK 98194 A3	05-01-1995
			TR 26490 A	15-03-1995
			WO 9317523 A1	02-09-1993
WO 9515538	A	08-06-1995	AT 159366 T	15-11-1997
			CA 2171335 A1	08-06-1995
			DE 69406306 D1	20-11-1997
			DE 69406306 T2	29-01-1998
			EP 0731957 A1	18-09-1996
			JP 9506193 T	17-06-1997
			US 5740284 A	14-04-1998
			US 5774598 A	30-06-1998
			US 5729631 A	17-03-1998
			US 5719958 A	17-02-1998
			US 5748770 A	05-05-1998